COMPRESSOR DISCHARGE CHAMBER WITH BAFFLE PLATE

BACKGROUND OF THE INVENTION

[0001] This application relates to the use of a baffle plate separating a compressor discharge chamber into sub-chambers, in the type of compressor having plural cyclically discharging flows.

[0002] Many types of compressors are utilized to compress various fluids. In one general type of compressor, the flow of a compressed fluid from the compression chambers occurs cyclically from a plurality of compression chambers. As an example, in a screw compressor having three rotors, there are two compression sets between, with one center screw and each one of the two side screws. These sets periodically discharge a compressed refrigerant into a discharge chamber through discharge ports. The ports are on opposed sides of the discharge chamber. If a single discharge chamber is utilized, there is the potential for cyclic fluctuations in the conditions within the discharge chamber. One example of such a compression discharge structure is disclosed in U.S. Patent 6,488,480, entitled Housing for Screw Compressor.

[0003] In such a three-screw compressor, the cyclic discharges create a fluid frequency which approached the natural mechanical frequency of the overall compressor, at compression speeds that were within the expected range of operation speeds for the compressor. When these two frequencies approached each other, unacceptable vibration occurred. Also, the magnitude of fluctuation and resultant noise are undesirably high in this existing compressor.

SUMMARY OF THE INVENTION

[0004] In a disclosed embodiment of this invention, a compressor delivers compressed fluid to discharge ports on opposed sides of a discharge chamber centerline. The discharge chamber is provided with a separating baffle plate between the two ports. In a preferred embodiment, the compressor is a three-screw compressor, and the baffle plate is essentially positioned along a centerline of the discharge chamber. In further features, the discharge chamber is somewhat frusto-conical, and necks downs from an upstream position to a downstream position, with the center plate also having this same general necking down feature.

[0005] These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 is a view of a compressor incorporating the present invention.

[0007] Figure 2 is an end view of the discharge chamber according to this invention.

[0008] Figure 3 is a somewhat schematic cross-sectional view.

[0009] Figure 4 is a somewhat schematic end view.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] A compressor 20 is illustrated in Figure 1 having a housing 21 receiving a central drive screw 22 and two opposed screws 24 and 26. A discharge plate 28 receives

compressed refrigerant from compression chambers 32 and delivers this compressed refrigerant through discharge ports in the plate 28 (not shown in Figure 1) to a discharge chamber 33 in an outlet housing 34. As known, refrigerant is delivered through inlet ports 30, and compressed between the screws 22 and 24 and 22 and 26 toward the discharge ports 32. As shown, a baffle plate 36 is positioned generally in the middle of the discharge chamber 33. The size of the chamber 33 necks down with the inner peripheral surface 38 of the outlet housing 34. As mentioned above, without the baffle plate 36, there has sometimes been undesirable vibration, noise and fluctuations occurring in the compressor 20. The baffle plate 36 serves to change the fluid frequency of the system such that the above-mentioned vibration will not occur during the normal operation range of compressor 20. Also the magnitude of fluctuation and noise are reduced significantly.

[0011] As shown in Figure 2, the baffle plate 36 generally splits the discharge chamber 33 in half. As shown, there are discharge ports 132 which are associated with the compression chambers 32, and which extend through the discharge plate 28 as mentioned above.

[0012] As shown schematically in Figure 3, the discharge chamber 33 has plate 36, and the plate 36 has the "necked" or somewhat frusto-conical shape as shown schematically at 38. As shown, an upstream end 41 of the necked portion 38 is attached to the discharge plate 28, and a downstream end 42 is connected to an outlet pipe 40. While Figure 3 simplifies the shape 38 to be frusto-conical, the actual shape may be generally curved as is better shown in Figure 1. As can be appreciated from the combination of Figure 3 and Figure 1, which are generally perpendicular views relative to each other, the "necking

down" of the chamber 33 occurs along both dimensions, and not just in one of the two cross sections.

[0013] Figure 4 shows the baffle plate 36 bisecting the discharge chamber 33. Now, with the use of the baffle plate 36, the frequency of the fluid flow does not approach the natural frequency of the compressor structure under any expected operation range of the compressor 20. As such, the undesirable vibrations mentioned above should not occur. Also, the magnitude of fluctuations is reduced.

[0014] While the invention is most preferably utilized in combination with a screw compressor, other types of compressors having sets of discharge ports on opposed sides of the compressor may also benefit from this invention. Of course, the concept of separating the single discharge chamber through the use of baffle plates can extend to compressors having more than two compression chambers. Further, more than one baffle plate can be utilized even when there are two compression chambers to provide greater control over the fluid frequency.

[0015] Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.